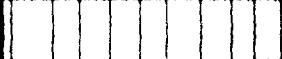


AD-A281 061



NAVY EXPERIMENTAL DIVING UNIT

REPORT NO. 5-94

EVALUATION OF BAUER K-20 DIESEL DRIVE
HIGH PRESSURE BREATHING AIR COMPRESSOR

GEORGE D. SULLIVAN
DECEMBER 1993

94-20482



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DEPARTMENT OF THE NAVY
NAVY EXPERIMENTAL DIVING UNIT
321 BULLFINCH ROAD
PANAMA CITY, FLORIDA 32407-7015

IN REPLY REFER TO:

NAVSEA TASK 92-002 & 92-003

NAVY EXPERIMENTAL DIVING UNIT

REPORT NO. 5-94

EVALUATION OF BAUER K-20 DIESEL DRIVE
HIGH PRESSURE BREATHING AIR COMPRESSOR

GEORGE D. SULLIVAN
DECEMBER 1993

Approved for public release; distribution unlimited

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| | | | | | | | | | | | | | | | |
| 19. ABSTRACT (Continue on reverse if necessary and identify by block number) In response to NAVSEA tasking, Navy Experimental Diving Unit (NEDU) evaluated the BAUER K-20 Diesel Drive High Pressure Breathing Air Compressor from Oct 13, 1993 to Nov 02, 1993. This test was to determine if the compressor system, when operating at 5000 PSI, met Navy diving community requirements. Based on the test results NEDU recommends that the compressor not be placed on the Approved for Navy Use list published by NAVSEA OOC. | | | | | | | | | | | | | | | |
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I. INTRODUCTION

In response to NAVSEA tasking^{1,2} two BAUER 20 CFM, MODEL K-20, NSN 4310-01-291-8028 Diving Air compressors equipped with Bauer P-5 purification systems were tested by the Navy Experimental Diving Unit (NEDU). The purpose of the test was to:

- A. Determine if the compressor and Purification System provides compressed air at the required pressures, flow rates, quality and cleanliness required by the U.S. Navy³.
- B. Determine the adequacy of the manufacturer's information, instructions and guidance for the safe operation and overall management of the compressor.

II. EQUIPMENT DESCRIPTION

A. GENERAL

The BAUER 20 CFM MODEL K-20 high pressure, breathing air compressor (Figure 1) is of a four stage, four cylinder, "X" configuration. The fourth stage cylinder is lubricated by means of a forced-fed lubrication system; the other cylinders and running gear are mist-lubricated.

The BAUER compressor unit consists of compressor block, condensate separator system, purification system, instrument panel, fuel tank, and a diesel engine in a skid-mounted frame.

The drive unit during this test was a Deutz, Model F2L912, 27 hp, air cooled, two-cylinder diesel engine. The engine is designed to start electrically by means of a 12 v battery, or manually with a hand crank. It is equipped with a cold weather starting aid system. A V-belt pulley and hand-operated Rockford clutch transfers rotating torque to the compressor via two V-belts.

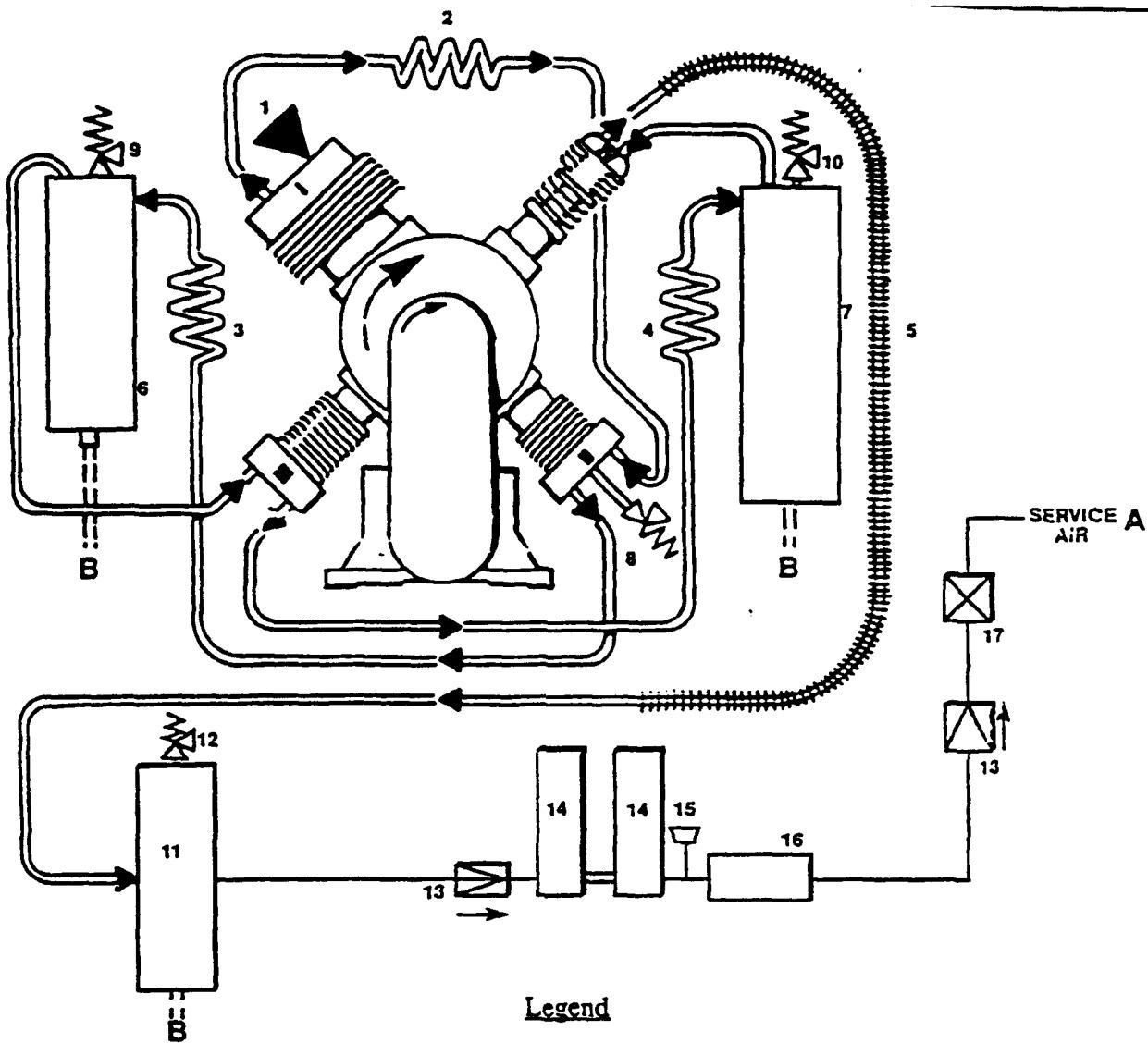
The purification system utilizes two replaceable cartridges (BAUER filter PART No. 058825 with molecular sieve, and PART No. 068416 with activated carbon and hopcalite).

The oil/water separator block is installed between the 2nd, 3rd, and 4th stages. The drawn-off oil/water is maintained in the separator blocks until the condensate drain is manually activated. The oil/water separator block is equipped with a condensate heater for use in cold weather to prevent the condensate from freezing. The separator block requires routine maintenance consisting of periodic draining. Residual oil and water vapors that are not drained manually are removed by the purification cartridge system. The treated air is free of oil, taste, smell, and carbon monoxide.

The BAUER 20 CFM, MODEL K-20 Diving Air Compressor comes with one Technical Manual⁴ which is divided into the following sections;

1. Equipment Description and Data
2. Description and Use of the Operator's Controls and Indicators
3. Preventive Maintenance Checks and Services

AIR FLOW DIAGRAM



Legend

| | |
|--|---|
| 1. Intake Filter | 9. Interm. Pressure Safety Valve (2nd stage) |
| 2. Intercooler (1st stage) | 10. Interm. Pressure Safety Valve (3rd stage) |
| 3. Intercooler (2nd stage) | 11. Condensate Block (4th stage) |
| 4. Intercooler (3rd stage) | 12. Final Pressure Relief |
| 5. After Cooler | 13. One-Way Valve |
| 6. Condensate Block (2nd/3rd stage) | 14. Filters |
| 7. Interfilter (3rd/4th stage) | 15. Bleed Off Valve |
| 8. Interm. Pressure Safety Valve (1st stage) | 16. Pressure Maintaining Valve |
| | 17. Service Valve |

A Air Outlet

B Condensate Outlet

Note: Condensate Blocks 6, 7, and 11 are actually mounted on a heated condensate drain manifold along with the final separator.

4. Operation Under Normal Conditions
5. Fuel Oil and Lubrication Requirements
6. Unit Troubleshooting Procedures
7. Unit Maintenance Procedures

According to the manufacturer's literature⁴, the BAUER, Model K-20 compressor has a capacity of 566 liters per minute (20 scfm) free air delivered. The purification cartridges have an air processing capability for 80 hours of use or six months.

A pressure maintaining/non-return valve (which is set between 124 and 134 bars [1,800 and 2,000 psig]) is provided down-stream from the purification filter system. This achieves constant, optimum filtering, moisture separation, fourth stage piston ring expansion/cylinder sealing, and prevents compressed air return from the air storage flasks to the compressor during unit shut down. All four stages of the compressor are protected by safety relief valves. A diagram of the compressor system is provided in Figure 1. The compressor comes with two final system safety valves. The scuba charging whip relief is set at 220 bar (3,200 psig) and the air service line relief is set at 346 bar (5,100 psig).

III. TEST PROCEDURE RESULTS

Two compressor units were tested⁵. For identification purposes they are referred to as compressor (A) and compressor (B).

There are various methods of testing compressor capacities, stability, and reliability⁶. For this compressor evaluation, NEDU chose to continuously run the compressors for extended periods, charging a 87.7 liter (3.1 cuft) cylinder from 0 to 345 bars (0 to 5,000 psig). BAUER purification cartridges (PART No. 058825 and 068416) were used for these tests.

Compressor (A) and all ancillary equipment was received and set up according to manufacturer's instructions. A Cole Palmer Model 8502-14 temperature monitor and Yellow Springs Instruments 700 Series thermistor probes were attached for measuring compressor discharge and ambient temperatures. An Analox carbon monoxide monitor was used to analyze compressor discharge air before and after the filter purification system with the sample flow rate set at 3.0 mL per minute. Nitrogen with a 50.8 PPM mixture of Carbon Monoxide (CO) was used to calibrate the high range of the monitor, and ambient air was used to set the monitor's low range at 0.

A gas mixture of 24.4% carbon monoxide and 75.6% nitrogen was injected into the compressor intake by a Victor Equipment Company manual regulator through a Fisher/Porter flow meter.

The introduction of carbon monoxide was adjusted to maintain 50 PPM of carbon monoxide at the inlet to the central purification system. Appendix A and B shows the recorded data from the Test Log. The unit was operated in an exterior work area, open to ambient temperature and humidity. The testing included subjective evaluation of the system operation but did not include detailed mechanical review of the individual components of the system.

Testing of compressor (A) was suspended at 29.6 test hours because of the failure of the automatic condensate drain (ACD) block securing bolts, excessive vibration, and repeated oil line fitting failure.

Compressor (B) was configured with the testing instrumentation used on compressor (A) and the compressor was operated for a total of 50 hours. Appendix B shows recorded data from the Test Log.

Compressor (A) testing resumed after the mechanical deficiencies were corrected by a factory on-site representative. The following parameters were recorded:

1. Date
2. Time
3. Meter Test Hours
4. Ambient Temperature
5. Compressor Air Discharge Temperature
6. Ambient Humidity
7. Carbon Monoxide PPM (Before/After Filtration)
8. Injected Carbon Monoxide Flow Rate and Percentage
9. Engine Oil Pressure
10. Engine Cylinder Head Temperature
11. Alternator Output Voltage
12. Compressor Oil Pressure
13. Compressor Final Discharge Pressure
14. Service Line Discharge Pressure
15. Cylinder Charging Times

A. AIR DELIVERY

Compressor capacity was determined (27.62 scfm) by calculating the average time between compressor A (673.83 SLPM (28.82 CFM)) and B (747.95 SLPM (26.41 CFM)) to charge a (3.1 cuft) floodable volume cylinder from 0 to 345 bars (0 to 5,000 psig). Calculations are shown in Appendix A-10 and B-7.

B. AIR SAMPLING

Air samples were taken from the compressor purification system discharges. The sample on Compressor (A) was taken at 1 hour running time. Two samples were taken on Compressor (B) at the 25 hour and 45 hour test period. Samples were sent to the CSS Laboratory, Code 5130, for purity analysis. Appendix C lists the air sample analysis results. The P-5 purification system was previously evaluated in NEDU tests 91-17, 91-28 and recommended for approval in NEDU reports 08-91 and 12-91.

C. OIL LUBRICATION

At the beginning of the test^s, compressor (A) engine oil level was 1.89 liters (2 quarts) below Full, and the compressor oil was .47 liters (1 pint) below Full. Compressor (B) engine was 2.36 liters (2.5 quarts) below Full, and the compressor was .47 liters (1 pint) below Full. Both units were filled to their prescribed limits. Oil levels were checked at the beginning and end of

each testing period, or every 8 hours. Oil consumption was logged in Appendix A and B. The engine requires 4.7 liters (5 quarts) of Navy symbol 9250. The compressor requires approximately 4.0 liters (4.2 quarts) of MIL-L-17331 2190TEP and MIL-H-17672 (Arctic Temperature) 2135TH lubricating oil.

D. OIL CONSUMPTION

During the 50 hour test⁵, a total of 0.47 liters (1 pint) of oil was added to compressor (B) and 0.23 liters (0.5 pint) of oil added to compressor (A). No engine oil was required for either unit.

E. DIESEL FUEL

The diesel engine is fitted with a 49.20 liter (13 US gallon, 10.8 Imperial gallon) fuel tank. Both compressor engines were run at the full factory throttle setting during the entire testing period. Compressor (A) used 206 liters (54.5 gallons, 45.3 imperial gallons) of diesel fuel. The average fuel consumption was 4.12 liters (1.09 gallons, 0.90 imperial gallon) per hour. Compressor (B) used 208 liters (55 gallons, 45.7 imperial gallons) of diesel fuel. The average fuel consumption was 4.16 liters (1.1 gallons, 0.91 imperial gallon) per hour.

F. MAINTENANCE

Scheduled maintenance was performed per the manufacturer's instructions⁴. This included checking the tension of drive belts, the engine/compressor oil levels, lubrication of the clutch throw-out collar, checking the engine oil bath air cleaner every 10 hours. At 24 hours, the engine oil was changed on compressor (A).

IV. OBSERVATIONS/RECOMMENDATIONS

A. Compressor (A) experienced excessive vibration contributing to component failure and complete unit failure at 29.9 hours of operation as listed in (APPENDIX A). A factory representative was called in and determined the vibration was caused by incorrect engine/compressor speed (factory set). Both compressor A and B engine "full throttle" speeds were re-adjusted by the factory representative to within factory specifications (2,100 to 2,300 RPM) then fine tuned to achieve a point of least vibration. This was accomplished at approximately 2,200 RPM as indicated on a mechanical tachometer. There is no mechanical or electrical device installed on the unit to determine or set engine/compressor speed. It is recommended that a tachometer be installed on the diesel engine and instructions provided for correctly setting the engine/compressor speed.

B. The ACD block securing bolts failed from excessive vibration and misalignment of piping. The manufacturer's maintenance manual⁴ (page 4-11 step 7) instructs the mechanic to bolt the ACD block to the compressor. Step 8 gives direction to then attach the six tubes to the ACD block. The factory representative (during his repair) first connected the six tubes to the ACD block prior to bolting it to the compressor. He said it helped relieve stress and vibration caused by misalignment. It is recommended that the Technical Manual⁴ be changed to reflect the above installation procedure.

C. The oil fill plug on the final line pressure gauge of compressor A fell out. This required replacing the gauge. The factory representative stated this was due to ambient temperature fluctuations. The failure of such instrumentation could cause equipment failure. NEDU recommends the gauges be replaced with gauges that are not subject to failure due to ambient temperature changes.

D. Gauges have no operating parameters listed. Operating parameters should be listed on each instrument i.e., ENGINE OIL PRESS 30 - 90 PSI.

E. The discharged condensation contained oily waste. The drain pipe discharged this oil/water waste on the ground leaving an oil residue and a possible safety hazard. Page 3-22 of the Technical Manual⁴ states:

The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters of the United States etc.

Since this compressor could be used on the deck of a vessel, NEDU recommends the condensate drain be piped into a non-pressurized tank that can be emptied in a controlled manner.

F. The fuel filter is the spin off automotive type and is mounted horizontally on the engine. Replacement of this filter can not be accomplished without spilling its contents. The fuel filter should be mounted vertically.

G. Compressor B oil pressure was operating as low as 52 bars (760 psi) (Appendix B). The factory representative stated it was too low and adjusted the oil pressure regulator to 60 bars (880 psi). The Technical Manual⁴ page 2-1 states: Pressure normally reads between 51 to 59 bars (750 to 870 psi). It is recommended that the Technical Manual⁴ be corrected to reflect the correct parameters.

H. The compressor unit comes with a SCUBA charging connection, fitted with a relief valve set at 224 bars (3300 psi) and connected to a 344 bars (5000 psi) hose whip. Charging a single 2,265 liter (80 cuft) cylinder directly from the compressor would exceed the recommended charging rate⁶. This is noted for the information of all operators.

I. The fuel tank fill opening was directly over the engine exhaust manifold. There was no label warning operators to secure the engine and let it cool before adding fuel. It is recommended that the fuel tank be turned 180° in its mount. This will place the fill opening away from the engine exhaust manifold.

J. The fuel supply line has no shut off valve. It is recommended that a fuel valve be installed.

K. The rubber fuel lines rub against the skid frame. The vibration of the running unit started wearing a hole through the hose. The Army has a field modification which calls for wrapping the hose in canvas wrapping. These compressors were not modified. All compressors should be modified to include a chaffing guard on the fuel lines.

V. CONCLUSIONS

Numerous equipment failures, excessive vibration and maintenance problems occurred during both this evaluation and the one conducted in NEDU test 91-17. After the factory representative worked on both compressor A and B they seemed to operate satisfactory with less vibration than before his adjustments. Thirteen additional hours were logged on each compressor, while charging numerous Army Special Divers Air Support System (SDASS) flasks. The compressors operated satisfactory during this period. The Bauer K-20 compressor was built to the requirements of an Army specification written to provide a compressor to be used in an unusual application. The Army presently has approximately 75 of these units.

The high pressure air compressor delivers air which meets USN standards³ at an average rate of 782.11 LPM (27.62 CFM) per Appendix A and B. This meets the manufacturer's specifications. However, due to reliability and safety concerns, NEDU is recommending that the BAUER 20 CFM 5000 psi, MODEL K-20, NSN 4310-01-291-8028 not be included on the ANU list⁷. NEDU recommends that no additional compressors be procured.

VI. REFERENCES

1. NAVSEA Task 92-002. Evaluation of commercially available divers air compressors.
2. NAVSEA Task 92-003. Evaluation of Commercially Available Filters for H.P. and L.P. Breathing Air.
3. NAVSEA 0994-LP-001-9010. U.S. Navy Diving Manual Volume 1, Rev 3, Para 5.3.2. Air Purity Standards, 15 December 1988.
4. Army Technical Manual, M-5-4310-389-14 Operator, Unit and Intermediate (Direct Support/General Support) Maintenance Manual.
5. Navy Experimental Diving Unit Test Plan Number 93-34, September 1993.
6. Naval Ships Technical Manual, S9086-SY-STM-010, Chapter 551 1st Rev. 1 November 1987. Compressed Air Plants and Systems, para 551-4.2.21.
7. NAVSEAINST 10560.2B, Diving Equipment Authorized for Navy Use.
8. U.S. Army Contract Modification Number P00013 dated 23 October 1993. Issued by U.S. Army Aviation & Troop Command AMSAT-A-PSLE Ralph Macias 314-263-2535 4300 Goodfellow Boulevard St. Louis, Mo. 83120-1798.

APPENDIX A - Test log

BAUER H.P. COMPRESSOR (A)

DATE 13 OCTOBER 1993

| REAL TIME | METER HOURS | TIME "T" | | AMBI STATION | | CO CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | | INNO OIL PRESS | | CYL HEAD TEMP °F | | AMP METER VOLTS | | COMP OIL PRESS | | FINAL LINE PS | | SERVICE LINES DISCH PS | | CHARGED CYLINDER 622 CUFT | | RATED PS | | CYLINDER CHARGING INFORMATION | | | | | |
|-----------|-----------------|-------------|--------------|--------------|----------------|------------------|---------|-------------------------------|----|----------------|-----|------------------|-------|-----------------|-----|----------------|------|---------------|---|------------------------|---|---------------------------|---|----------|---|-------------------------------|---|------|-------|-------|-----|
| | | AMBI TEMP°F | COMP DSCOP°F | AMBI FILTER | AIRLINE FILTER | FLOW RATE | GAS % | | | | | | | | | | | | | | | | | | | | | | | | |
| 0609 | 23.4 | 65° | 65° | 70% | - | - | - | - | - | 90 | - | +5V | 860 | 1,700 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| 0620 | 23.8 | 72° | 65° | 61% | 50 PPM | 1.0 CFM | 24.4% | 95 | - | +5V | 870 | 3,500 | 3,500 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| 0630 | 24.0 | 65° | 55° | 50% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 870 | 5,000 | 5,000 | 3.4 | 5.00 | 0634 | - | - | - | - | - | - | - | - | - | - | - | | | |
| 0640 | 24.4 | 65° | 70° | 53% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 870 | 2,800 | 2,800 | 3.4 | 5.00 | - | - | - | - | - | - | - | - | - | - | - | - | | | |
| 0650 | 24.9 | 65° | 61° | 50% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 870 | 4,900 | 4,900 | 3.4 | 5.00 | - | - | - | - | - | - | - | - | - | - | - | 0650 | 5,000 | :56 | |
| 1000 | 25.4 | 65° | 70° | 49% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 870 | 3,100 | 3,100 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 1000 | 25.9 | 71° | 65° | 47% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 870 | 2,000 | 2,000 | 3.4 | 5.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 1100 | 26.4 | 72° | 55° | 36% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 860 | 1,800 | 1,800 | 0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 1120 | SECURED TESTING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1217 | STARTED TESTING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1220 | 27.2 | 70° | 65° | 50% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 865 | 4,000 | 4,000 | 0 | 3.4 | 5.00 | - | - | - | - | - | - | - | - | - | - | - | 1220 | - | |
| 1300 | 27.7 | 75° | 65° | 50% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 865 | 3,500 | 3,500 | 3.4 | 5.00 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 1350 | 28.2 | 75° | 80° | 56% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 865 | 2,100 | 2,100 | 3.4 | 5.00 | - | - | - | - | - | - | - | - | - | - | - | - | 1352 | 5,000 | :42 |
| 1400 | 28.7 | 77° | 65° | 50% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 865 | 1,900 | 1,900 | 3.4 | 5.00 | - | - | - | - | - | - | - | - | - | - | - | - | 1353 | - | |
| 1450 | 29.2 | 78° | 80° | 50% | 50 PPM | 0.9 CFM | 1.05 CC | 24.4% | 90 | - | +5V | 865 | 4,400 | 4,400 | 3.4 | 5.00 | - | - | - | - | - | - | - | - | - | - | - | - | 1455 | 5,000 | :42 |
| 1453 | SECURED TESTING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

REMARKS:

0700 STARTED INSTRUMENT CALIBRATION

0700 CHECKED ENGINE & COMPRESSOR OIL (ADDED 1 QT 5250 ENGINE OIL AND 1/2 QT 1160 TEP COMPRESSOR OIL)

0715 ADDED 10 GALLONS OF DIESEL FUEL

1130 LEAK ON COMPRESSOR OIL GAUGE SUPPLY LINE (REPLACED SWEDIS LOC FITTINGS)

1305 SERVICE VALVE HAND WHEEL PEEL OFF

APPENDIX A - Test log

DATE 14 OCTOBER 1993

BAUER H.P. COMPRESSOR (A)

| REAL TIME | MASTER HOURS | TEMP °F | | AIR HUMID % | COMP CONCENTRATION | CO INJECTED INTO COMP. INTAKE | ENR PRESS | CYL HEAD TRAP TIME | AMP METER VOLTS | COMP OIL PRESS | FINAL LINES PSI | SERVICE LINES LEACH PSI | CHARGED CYLINDER SIZE | CHARGING INFORMATION | CYL FILL TIME | MIN. | |
|--------------|-----------------|----------------|------------------|-------------------|-----------------------|-------------------------------------|--------------|-----------------------------|-----------------------|----------------------|-----------------------|----------------------------------|-----------------------------|----------------------|---------------------|------|--|
| | | AMIN TEMP°F | COMP DISCHG°F | | | | | | | | | | | | | | |
| 0635 | 28.4 | 65° | 34° | 95% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 100 | +5V | 865 | 1,900 | 0 | | | | |
| 0700 | 29.4 | 66° | 35° | 95% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 95 | +5V | 865 | 2,000 | 2,000 | | | | |
| 0720 | 30.4 | 70° | 60° | 95% | 48 ppm | 0 ppm | 1.05 CC | 24.4% | 95 | +5V | 865 | 1,900 | 0 | | | | |
| 1000 | 30.8 | 72° | 61° | 85% | 48 ppm | 0 ppm | 1.05 CC | 24.4% | 95 | +5V | 865 | 3,600 | 3,600 | | | | |
| 1000 | 31.3 | 73° | 70° | 75% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 2,000 | 2,000 | 9.4 | 5,000 | 1012 | |
| 1100 | 31.8 | 76° | 70° | 61% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 1,700 | 1,000 | 9.4 | 5,000 | 1053 | |
| 1130 | 32.3 | 75° | 63° | 61% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 4,400 | 4,400 | | | | |
| 1200 | 32.8 | 76° | 64° | 86% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 2,800 | 2,800 | | | | |
| 1230 | 33.3 | 77° | 65° | 70% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 5,000 | 5,000 | | | | |
| 1300 | 33.8 | 77° | 70° | 77% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 1,750 | 1,100 | | | | |
| 1330 | 34.3 | 79° | 65° | 76% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 4,600 | 4,600 | | | | |
| 1400 | 34.8 | 79° | 58° | 75% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 3,100 | 3,100 | | | | |
| 1400 | 35.3 | 79° | 65° | 76% | 50 ppm | 0 ppm | 1.05 CC | 24.4% | 90 | +5V | 865 | 2,100 | 1,850 | | | | |
| 1445 | SECURED TESTING | | | | | | | | | | | | | | | | |

REMARKS:

0700 STARTED INSTRUMENT CALIBRATION

0715 CHECKED ENGINES & COMPRESSOR OIL

0715 ADDED 10 GALLONS OF DIESEL FUEL

0815 STARTED ENGINE

1015 ADJUSTED BACK PRESSURE REGULATOR VALVE

APPENDIX A - Test log

BAUER H.P. COMPRESSOR (A)

DATE 15 OCTOBER 1993

| REAL TIME | METER HOURS | TIME *P | AMBI TEMP*F | AMBI ROAD | COFFM CONCENTRATION | CO INJECTED INTO COMP. INTAKE | ENGIN OIL PRESS | CYL HEAD TEMP °F | AMP METER VOLTS | CYLINDER CHARGING INFORMATION | | | |
|----------------------------|------------------------|---------|-------------|-----------|---------------------|-------------------------------|-----------------|------------------|-----------------|-------------------------------|-----------|------------|----------|
| | | | | | | | | | | RATED CYLINDER HP | RATED RPM | START TIME | END TIME |
| 6PM STARTED TESTING | | | | | | | | | | | | | |
| 600 | 55.8 | 70° | 70° | 100% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 2,100 | 1,750 | |
| 6020 | 56.3 | 70° | 69° | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 2,100 | 900 | - | |
| 6030 | 56.8 | 70° | 69° | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 4,100 | 3,400 | 1,000 | |
| 6035 | 57.3 | 70° | 69° | 100% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 5,000 | 3,400 | 600 |
| 1000 | 57.8 | 70° | 70° | 97% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 2,100 | 900 | - |
| 1000 | 58.3 | 70° | 69° | 95% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 4,000 | 3,400 | - |
| 1100 | 58.8 | 70° | 69° | 90% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 2,900 | 2,900 | - |
| 1150 | 59.3 | 70° | 69° | 85% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 2,100 | 1,900 | - |
| 1200 | 59.8 | 70° | 69° | 80% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 5,000 | 5,000 | - |
| 1250 | 60.3 | 70° | 69° | 85% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 5,100 | 5,100 | - |
| 1300 | 60.8 | 69° | 62° | 80% | 0.9794 | 1.05 CC | 24.45 | 90 | +3V | 860 | 2,100 | 1,400 | - |
| 1300 | SECURED TESTING | | | | | | | | | | | | |

REMARKS:
 6700 STARTED INSTRUMENT CALIBRATION
 6720 CHECKED ENGINE & COMPRESSOR OIL
 6734 ADDED 10 GALLONS OF DIESEL FUEL.

APPENDIX A - Test log

DATE 18 OCTOBER 1993

BAUER H.P. COMPRESSOR (A)

| REAL TIME | METER READS | TIME "P" | AUXILIARY % | CO2 CONCENTRATION | | INJECTED INTO COMP. INTAKE | | ING. OIL PRESS. | CYL HEAD TEMP | AMP METER VOLTS | Cylinder Information | |
|------------------------|------------------------|----------|-------------|-------------------|--------------|----------------------------|---------|-----------------|---------------|-----------------|----------------------|----------|
| | | | | AIRPORT FILTER | AFTER FILTER | FLOW RATE | OIL % | | | | START TIME | END TIME |
| STARTED ENGINES | | | | | | | | | | | | |
| 0620 | 41.9 | 75° | 71° | 91% | 47 PPM | 0 PPM | 1.05 CC | 24.45 | 90 | +5V | 865 | 2,100 |
| 0620 | 41.5 | 75° | 89° | 89% | 39 PPM | 2 PPM | 1.05 CC | 24.45 | 90 | +5V | 865 | 2,900 |
| 0620 | 42.0 | 89° | 72° | 86% | 39 PPM | 0 PPM | 1.05 CC | 24.45 | 90 | +5V | 860 | 2,100 |
| 1000 | 42.5 | 82° | 91° | 82% | 48 PPM | 0 PPM | 1.05 CC | 24.45 | 90 | +5V | 860 | 4,200 |
| 1000 | 43.0 | 89° | 90° | 74% | 49 PPM | 2 PPM | 1.05 CC | 24.45 | 90 | +5V | 860 | 2,900 |
| 1100 | 43.5 | 83° | 70% | 70% | 39 PPM | 4 PPM | 1.10 CC | 24.45 | 90 | 100° | +5V | 840 |
| 1130 | 44.0 | 89° | 97° | 69% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | 100° | +5V | 860 |
| 1200 | 44.5 | 83° | 77° | 69% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | 100° | +5V | 840 |
| 1250 | 45.0 | 89° | 70% | 69% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | 100° | +5V | 860 |
| 1300 | 45.5 | 89° | 90° | 71% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | 100° | +5V | 860 |
| 1350 | 46.0 | 83° | 85° | 71% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | 100° | +5V | 860 |
| 1400 | 46.5 | 83° | 97° | 71% | 50 PPM | 1 PPM | 1.10 CC | 24.45 | 90 | 100° | +5V | 860 |
| 1450 | 47.0 | 89° | 89° | 71% | 50 PPM | 1 PPM | 1.10 CC | 24.45 | 90 | 100° | +5V | 860 |
| 1455 | SECURED TESTING | | | | | | | | | | | |

REMARKS

0700 STARTED INSTRUMENT CALIBRATION
 0730 CHECKED ENGINE & COMPRESSOR OIL
 0735 ADDED 10 GALLONS OF DIESEL FUEL

APPENDIX A - Test log

BAUER H.P. COMPRESSOR (A)

DATE 19 OCTOBER 1993

| REAL TIME | METER HOURS | TIME ^a | AMIN ROUTED | COFFIN CONCENTRATION | CO INJECTED INTO COMP. INTAKE | ENR OIL PRESS | AMP HEAD TEMP | CTL COMP CELL PRESS | CYLINDER CHARGING INFORMATION | | CYL. FILL TIME MIN. |
|--------------|----------------|-------------------|----------------|-------------------------|-------------------------------------|---------------------|---------------------|------------------------------|----------------------------------|--------------|------------------------------|
| | | | | | | | | | CHARGED CYLINDER SIZE | RATED PSI | |
| | | | | | | | | | CUFT | CUFT | |
| 0025 | | | | | | | | | 100 | +3V | |
| 0710 | 47.0 | 70° | 62° | 100% | 47 PPM | 0 PPM | 1.10 CC | 24.45 | 100 | +3V | 860 |
| 0710 | 47.4 | 70° | 62° | 91% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 865 |
| 0800 | 48.1 | 70° | 71° | 91% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 860 |
| 0814 | | | | | | | | | | | |
| 0815 | | | | | | | | | | | |
| 0816 | 48.4 | 80° | 80° | 80% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 860 |
| 0816 | 48.1 | 80° | 80° | 74% | 49 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 860 |
| 1000 | | | | | | | | | | | |
| 1010 | | | | | | | | | | | |
| 1010 | 50.4 | 80° | 80° | 80% | 50 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 860 |
| 1010 | 50.1 | 80° | 80° | 74% | 49 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 860 |
| 1010 | | | | | | | | | | | |
| 1024 | | | | | | | | | | | |
| 1024 | | | | | | | | | | | |
| 1120 | | | | | | | | | | | |
| 1130 | 50.1 | 80° | 80° | 80% | 50 PPM | 1 PPM | 1.10 CC | 24.45 | 90 | +3V | 860 |
| 1200 | 50.6 | 80° | 80° | 73% | 46 PPM | 1 PPM | 1.10 CC | 24.45 | 90 | +3V | 845 |
| 1200 | | | | | | | | | | | |
| 1223 | | | | | | | | | | | |
| 1223 | | | | | | | | | | | |
| 1229 | 50.9 | 80° | 80° | 71% | 46 PPM | 1 PPM | 1.10 CC | 24.45 | 90 | +3V | 860 |
| 1300 | 51.3 | 80° | 81° | 70% | 46 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 850 |
| 1320 | 51.8 | 80° | 81° | 70% | 45 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 840 |
| 1400 | 51.3 | 80° | 80° | 72% | 46 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 845 |
| 1400 | 52.4 | 80° | 81° | 71% | 46 PPM | 0 PPM | 1.10 CC | 24.45 | 90 | +3V | 860 |
| 1401 | | | | | | | | | | | |
| 1401 | | | | | | | | | | | |

DEMANA
AND STARTED DISTERILANT CALIBRATION
AND CHECKED INSIDE A CONFINEMENT OIL
AND ADDED 10 GALLONS OF DIESEL FUEL.
AND SECURED OIL LEAK ON COMPRESSOR OIL GAUGE SUPPLY LINE (REPLACED SWING LOCK FITTINGS)
AND ADJUSTED BACK PRESSURE REGULATOR VALVE
AND COOLING OIL AND STAGE AIR LINE SWING LOCK FITTING LEAKING (REMOVED INTAKE)
AND FILTERABLE INTAKE LINE WIRE TIE DOWN AT ATTACHMENT POINT (CUT BACK SIDE AND REMOVED SIDE)
DID PLASTIC LINE SIGHT COULD LONG AND PULL OFF

APPENDIX A - Test log

BAUER H.P. COMPRESSOR (A)

DATE 20 OCTOBER 1993

| REAL TIME | MOTOR HOURS | TIME "P" | AMBIENT TEMP. | COFFIN CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | | END OIL PRESS. | CYL HEAD TEMP. | AMP METER VOLTS | CYLINDER INFORMATION | | CTL FILL TIME MIN. |
|-----------|----------------|-----------------|---------------|----------------------|--------|-------------------------------|--------------|----------------|----------------|-----------------|----------------------|------------|--------------------|
| | | | | AMBIENT | INTAKE | AMBIENT FILTER | AFTER FILTER | | | | RATED CYL PRES. | START TIME | END TIME |
| 0755 | STARTED ENGINE | | | | | | | | 100 | - | +5V | - | - |
| 0800 | 52.9 | 79° | 79° | 88% | 50 RPM | 0 RPM | 1.10 CC | 24.05 | 92 | +5V | 800 | 2.00 | - |
| 0804 | 53.4 | SECURED TESTING | | | | | | | | | | | |

REMARKS
ONE SEPARATOR DRAIN BLOCK SECURING BOLTS FAILED CAUSING THE DRAIN BLOCK TO SEAL UNCONTROLLABLY
ONE SECURED TESTING

APPENDIX A - Test log

DATE 27 OCTOBER 1993

BAUER H.P. COMPRESSOR (A)

| REAL TIME | MOTOR NUMBER | TIME °F | | AMBI TEMP °F | AMBI RHUM % | COMPO CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | | BNO OIL PRESS | CTL HEAD VOLTP | AMP METER VOLTP | FINAL LINE PSI | COUP OIL PRESS | CHABORD CYLINDER SIZES | | CYLINDER CHARGING INFORMATION | | | CTL FILL TIME MIN. |
|-----------|-----------------|-----------------|------------------|-----------------|-------------------|------------------------|----------------|-------------------------------------|--------------|---------------------|----------------------|-----------------------|----------------------|----------------------|------------------------------|---|----------------------------------|-------------|---------------|-----------------------------|
| | | AMBI TEMP °F | COPP DECEP °F | | | AMBI RHUM % | AMBI FILTER | AFTER FILTER | FLOW RATE | | | | | | + | - | RATED PSI | CUTT PSI | START TIME | END TIME |
| 0600 | STARTED ENGINES | | | | | | | | | | | | | | | | | | | |
| 0720 | 35.9 | 60° | 71° | 50% | | | | | | | | | | | | | | | | |
| 0742 | SECURED ENGINES | | | | | | | | | | | | | | | | | | | |
| 0803 | STARTED ENGINES | | | | | | | | | | | | | | | | | | | |
| 0820 | 34.7 | 72° | 50% | 50% | | | | | | | | | | | | | | | | |
| 0830 | 35.3 | 71° | 71% | 71% | | | | | | | | | | | | | | | | |
| 0850 | 35.7 | 70° | 65% | 65% | | | | | | | | | | | | | | | | |
| 1000 | 36.2 | 70° | 65% | 65% | | | | | | | | | | | | | | | | |
| 1020 | 37.7 | 80° | 60% | 60% | | | | | | | | | | | | | | | | |
| 1100 | 38.3 | 80° | 47% | 47% | | | | | | | | | | | | | | | | |
| 1130 | 38.7 | 80° | 35% | 35% | | | | | | | | | | | | | | | | |
| 1200 | 40.3 | 87° | 35% | 35% | | | | | | | | | | | | | | | | |
| 1220 | 40.7 | 80° | 65% | 65% | | | | | | | | | | | | | | | | |
| 1300 | 41.2 | 85° | 65% | 65% | | | | | | | | | | | | | | | | |
| 1330 | 41.7 | 86° | 65% | 65% | | | | | | | | | | | | | | | | |
| 1400 | 42.3 | 85° | 65% | 65% | | | | | | | | | | | | | | | | |
| 1430 | 42.7 | 85° | 65% | 65% | | | | | | | | | | | | | | | | |
| 1452 | SECURED TESTING | | | | | | | | | | | | | | | | | | | |

NOTES:

NOTE: FINAL PREVIOUS GAVES OIL FILL PSIG WAS MISSING. GAUGE LEAKING OIL AND WAS CHANGED

0600 STARTED INSTRUMENT CALIBRATION

0630 CHECKED ENGINE A COMPRESSOR OIL

0745 SECURED ENGINES FOR OIL CHANGES

0800 OIL CHANGE COMPLETED, STARTED ENGINES

1230 GUARDED CLUTCH THROUGHT-OUT BRAKING

1402 SECURED TESTING

APPENDIX A - Test log

BAUER H.P. COMPRESSOR (A)

DATE 28 OCTOBER 1993

| HEMIS TIME | INTEN SITIES | TEMP °F | AMBI TEMP°F | AMBI BLDING % COMP DENSITY | COMP CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | | FINAL LINE PRES | COMP OIL PRESS | CTL HEAD TEMP | AMP METER VOLTS | CYLINDER CHARGING INFORMATION | | |
|---------------|-----------------|---------|----------------|--|-----------------------|-----------------|-------------------------------------|----------|-----------------------|----------------------|---------------------|-----------------------|----------------------------------|---------------|-------------|
| | | | | | BEFORE FILTER | AFTER FILTER | FLOW RATE | OAS % | | | | | RATED CUTT | START TIME | END TIME |
| 0601 | STARTED ENGINE | | | | | | | 100 | | +10V | | | | | |
| 0720 | 61.5 | 70° | 61.5 | 70% | | | | 95 | | +10V | 600 | 2,200 | 1,400 | | |
| 0720 | 61.3 | 70° | 61.5 | 70% | | | | 95 | | +5V | 675 | 5,000 | 5,000 | | |
| 0800 | 61.4 | 61° | 70.5 | 70% | | | | 95 | | +5V | 600 | 2,200 | 2,200 | | |
| 0820 | 61.3 | 61° | 71.5 | 70% | | | | 95 | | +5V | 600 | 2,200 | 0 | | |
| 0820 | 61.0 | 60° | 70.5 | 70% | | | | 95 | | +5V | 600 | 5,000 | 5,000 | | |
| 0830 | 61.3 | 70° | 61.5 | 60% | | | | 95 | | +5V | 600 | 2,100 | 600 | | |
| 1000 | 61.8 | 72° | 61.5 | 60% | | | | 95 | | +5V | 600 | 2,300 | 2,500 | | |
| 1000 | 61.5 | 69° | 59.5 | 59% | | | | 95 | | +5V | 600 | 2,300 | 0 | | |
| 1100 | 61.4 | 67° | 60.5 | 59% | | | | 95 | | +5V | 600 | 3,000 | 3,000 | | |
| 1130 | 61.3 | 67° | 60.5 | 59% | | | | 95 | | +5V | 600 | 2,300 | 2,100 | | |
| 1200 | 61.3 | 67° | 60.5 | 59% | | | | 95 | | +5V | 600 | 3,500 | 3,500 | | |
| 1230 | 61.3 | 67° | 61.5 | 60% | | | | 95 | | +5V | 600 | 2,300 | 1,600 | | |
| 1300 | 61.3 | 73° | 61.5 | 60% | | | | 95 | | +5V | 600 | 4,000 | 4,000 | | |
| 1330 | 61.3 | 73° | 61.5 | 60% | | | | 95 | | +5V | 600 | 2,200 | 1,900 | | |
| 1400 | 61.4 | 73° | 61.5 | 60% | | | | 95 | | +5V | 600 | 5,000 | 5,000 | | |
| 1402 | SECURED TESTING | | | | | | | 95 | | | | | | | |

REMARKS

0601 STARTED INSTRUMENT CALIBRATION
 0601 CHECKED ENGINE & COMPRESSOR OIL
 0651 STARTED ENGINE & COMPRESSOR
 0730 ADDED 10 GALLONS OF DIESEL FUEL.

APPENDIX A - Test log

BAUER H.P. COMPRESSOR (A)

DATE 1 NOVEMBER 1993

1

REMARKS:
0700 STARTED INSTRUMENT CALIBRATION
0730 CHECKED ENGINE & COMPRESSOR OIL (ADDED 1 PINT COMPRESSOR OIL)

120 SECURED TESTING CONTRACTOR (A) IN IT COMPLETED

The mean time for pressurizing an 87.7 liter (3.1 cuft) flask from 0 to 345 bars (0 to 5000 psi, 341.14 ATA) is: $\frac{35.4 \times 2 + 42 + 41 + 41 + 41}{5} = 44$ minutes. therefore, the charging rate is: $\frac{87.7 \times 341.14}{44} = 67.83$ SLPM or 26.82 CFM

APPENDIX B - Test log

DATE 26 OCTOBER 1992

BAUER H.P. COMPRESSOR (B)

| REAL TIME | METER HOURS | TIME +P | | AMBI TEMP °F | CO2 DENSITY % | CO2 CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | CO FLOW RATE % | CO PRESS % | BNG OIL PRESS | FINAL LINE PRESS | SERVICE LIPS DRAIN PSI | CHARGED CYLINDER PSI | | CYLINDER CHARGING INFORMATION | | |
|--------------|----------------|------------------|-----------------|--------------------|---------------------|---------------------|--------------|-------------------------------------|-------------------------|------------------|---------------------|------------------------|---------------------------------|----------------------------|-------------|----------------------------------|------|--|
| | | BEFORE FILTER | AFTER FILTER | | | CYL HEAD TEMP | RATED PSI | | | | | | | START TIME | END TIME | END PSI | | |
| 0745 | 0.00 | | | | | | | | | | | | | | | | | |
| 0750 | 21.1 | 65° | 65° | 95% | 50 ppm | 0 ppm | 1.10 CC | 24.4% | 90 | - | +5V | 800 | 2,100 | 0 | | | | |
| 0800 | 21.4 | 65° | 71° | 97% | 50 ppm | 0 ppm | 1.10 CC | 24.4% | 90 | - | +5V | 700 | 2,100 | 800 | | | | |
| 0820 | 22.1 | 65° | 70° | 95% | 49 ppm | 0 ppm | 1.10 CC | 24.4% | 90 | - | +5V | 700 | 2,100 | 1,500 | | | | |
| 0830 | 22.6 | 65° | 67° | 94% | 49 ppm | 0 ppm | 1.10 CC | 24.4% | 90 | - | +5V | 700 | 2,300 | 2,500 | | | | |
| 1000 | 23.1 | 67° | 77° | 95% | 50 ppm | 0 ppm | 1.10 CC | 24.4% | 90 | - | +5V | 700 | 3,600 | 3,900 | | | | |
| 1030 | 23.6 | 65° | 74° | 95% | 48 ppm | 0 ppm | 1.5 CC | 24.4% | 85 | - | +5V | 700 | 2,400 | 2,100 | 3,4 | 5,000 | 1011 | |
| 1100 | 24.1 | 70° | 69° | 95% | 49 ppm | 1 ppm | 1.4 CC | 24.4% | 85 | - | +5V | 700 | 2,100 | 1,800 | | | 1031 | |
| 1130 | 24.7 | 72° | 76° | 93% | 46 ppm | 1 ppm | 1.4 CC | 24.4% | 85 | - | +5V | 700 | 2,400 | 2,100 | | | | |
| 1200 | 25.1 | 72° | 82° | 95% | 47 ppm | 1 ppm | 1.4 CC | 24.4% | 85 | - | +5V | 700 | 4,100 | 3,800 | | | | |
| 1230 | 25.7 | 70° | 79° | 93% | 47 ppm | 1 ppm | 1.4 CC | 24.4% | 85 | - | +5V | 700 | 2,200 | 1,900 | | | | |
| 1300 | 26.1 | 75° | 86° | 93% | 47 ppm | 1 ppm | 1.4 CC | 24.4% | 85 | - | +5V | 700 | 4,500 | 4,200 | | | | |
| 1330 | 26.7 | 70° | 69° | 95% | 48 ppm | 1 ppm | 1.4 CC | 24.4% | 85 | - | +5V | 700 | 2,000 | 200 | | | | |
| 1400 | 27.3 | 70° | 69° | 95% | 48 ppm | 1 ppm | 1.6 CC | 24.4% | 85 | - | +5V | 800 | 2,300 | 1,900 | | | | |
| 1430 | 27.6 | 70° | 76° | 75% | 23 ppm | 1 ppm | 1.5 CC | 24.4% | 85 | - | +5V | 800 | 2,100 | 1,100 | | | | |
| 1500 | 28.1 | 70° | 77° | 74° | 75% | 50 ppm | 11 ppm | 1.5 CC | 24.4% | 80 | - | +5V | 700 | 2,000 | 1,100 | | | |
| 1530 | 28.6 | 70° | 80° | 75% | 70% | 46 ppm | 1 ppm | 1.5 CC | 24.4% | 80 | - | +5V | 700 | 4,300 | 4,100 | | | |
| 1550 | 28.6 | 77° | 83° | 76% | 54 ppm | 1 ppm | 1.5 CC | 24.4% | 80 | - | +5V | 800 | 2,800 | 2,500 | | | | |
| 1600 | 29.1 | 70° | 87° | 81% | 56 ppm | 9 ppm | 1.5 CC | 24.4% | 80 | - | +5V | 700 | 3,600 | 3,900 | | | | |
| 1700 | 30.6 | 70° | 83° | 83% | 56 ppm | 10 ppm | 1.5 CC | 24.4% | 80 | - | +5V | 700 | 2,600 | 2,400 | | | | |

APPENDIX B - Test log

DATE 26 & 27 OCTOBER 1993

BAUER H.P. COMPRESSOR (B)

| REAL TIME | METER HOURS | TRANS.°F | | AMBIENT AIR | | CO/FM CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | | ENO OIL PRESS | | COMP. OIL PRESS | | FINAL LINES PPS | | SERVICE LINES DISCH PPS | | CHARGED CYLINDER RATED CAPT | | CYL FILL TIME MIN. | | CYLINDER CHARGING INFORMATION | |
|-----------|-------------|----------------|----------------|---------------|--------------|---------------------|--------|-------------------------------|-----------------|---------------|----------|-----------------|-------|-----------------|-----|-------------------------|-----------------|-----------------------------|----------------------------|----------------------------|----------------------------|-------------------------------|----------------------------|
| | | AMBIENT TEMP°F | COMP. DISCHG°F | BEFORE FILTER | AFTER FILTER | FLOW RATE | QAS % | CYL HEAD TEMP | AMP METER VOLTS | START TIME | END TIME | RATED CAPT | PIN | RATED CAPT | PIN | FINAL LINES PPS | FINAL LINES PPS | CHARGE CYLINDER RATED CAPT | CHARGE CYLINDER RATED CAPT | CHARGE CYLINDER RATED CAPT | CHARGE CYLINDER RATED CAPT | CHARGE CYLINDER RATED CAPT | CHARGE CYLINDER RATED CAPT |
| 1800 | 31.1 | 70° | 67° | 97% | 49 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 2,000 | 200 | - | - | - | - | - | - | - | - | - |
| 1800 | 31.2 | 70° | 68° | 99% | 48 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 2,000 | 200 | - | - | - | - | - | - | - | - | - |
| 1800 | 31.3 | 72° | 68° | 91% | 50 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 1,160 | 4,900 | - | - | - | - | - | - | - | - | - |
| 1800 | 32.3 | 72° | 67° | 93% | 54 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 3,600 | 3,300 | - | - | - | - | - | - | - | - | - |
| 2000 | 32.8 | 71° | 70° | 95% | 50 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 2,300 | 1,900 | - | - | - | - | - | - | - | - | - |
| 2000 | 33.3 | 71° | 68° | 97% | 56 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 5,100 | 4,800 | - | - | - | - | - | - | - | - | - |
| 2100 | 33.8 | 72° | 68° | 97% | 55 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 4,000 | 5,700 | - | - | - | - | - | - | - | - | - |
| 2120 | 34.3 | 70° | 80° | 96% | 50 PPM | 10 PPM | 1.3 CC | 24.45 | 65 | - | +5V | 700 | 2,600 | 2,500 | - | - | - | - | - | - | - | - | - |
| 2200 | 34.8 | 69° | 65° | 98% | 50 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 2,000 | 400 | - | - | - | - | - | - | - | - | - |
| 2220 | 35.3 | 68° | 75° | 98% | 50 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 5,200 | 4,900 | - | - | - | - | - | - | - | - | - |
| 2230 | 35.4 | 68° | 77° | 98% | 50 PPM | 17 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 2,800 | 2,600 | - | - | - | - | - | - | - | - | - |
| 2230 | 36.3 | 68° | 78° | 99% | 50 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 2,900 | 2,200 | - | - | - | - | - | - | - | - | - |
| 2400 | 36.8 | 68° | 65° | 98% | 50 PPM | 10 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 2,000 | 500 | - | - | - | - | - | - | - | - | - |
| 0030 | 37.3 | 68° | 80° | 98% | 50 PPM | 17 PPM | 1.3 CC | 24.45 | 65 | - | +5V | 700 | 5,000 | 4,700 | - | - | - | - | - | - | - | - | - |
| 0100 | 37.8 | 68° | 78° | 99% | 50 PPM | 16 PPM | 1.5 CC | 24.45 | 65 | - | +5V | 700 | 3,400 | 3,100 | - | - | - | - | - | - | - | - | - |
| 0130 | 38.3 | 67° | 75° | 100% | 50 PPM | 17 PPM | 1.3 CC | 24.45 | 65 | - | +5V | 700 | 2,900 | 2,000 | - | - | - | - | - | - | - | - | - |
| 0200 | 38.8 | 67° | 68° | 100% | 50 PPM | 10 PPM | 1.3 CC | 24.45 | 65 | - | +5V | 700 | 2,000 | 500 | - | - | - | - | - | - | - | - | - |

APPENDIX B - Test log

DATE 27 OCTOBER 1993

BAUER H.P. COMPRESSOR (B)

| REAL TIME | METER HOURS | TEMP °F | | CO2 CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | | CHARGED CYLINDER #723 | | CYLINDER CHARGING INFORMATION | | CYL FILL TIME MIN | | |
|-----------|-------------|-------------|--------------|-------------------|--------------|-------------------------------|--------|-----------------------|------------------|-------------------------------|---------------|-----------------------|-------|-----|
| | | AMBI TEMP°F | COMP DISCH°F | BEFORE FILTER | AFTER FILTER | FLOW RATE | OAS % | END OIL PRESS | CYL HEAD TRAP °F | AMP METER VOLTS | FINAL LINS PS | SERVICE LINE DRAIN PS | | |
| 0220 | 36.3 | 65° | 78° | 100% | 50 ppm | 19 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 4,000 | 4.60 | |
| 0220 | 36.4 | 65° | 75° | 100% | 48 ppm | 19 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 3,200 | 3,000 | |
| 0220 | 40.3 | 65° | 65° | 100% | 53 ppm | 18 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 2,200 | 1,600 | |
| 0220 | 40.3 | 65° | 70° | 100% | 51 ppm | 16 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 5,000 | 4,800 | |
| 0220 | 40.9 | 65° | 65° | 100% | 45 ppm | 19 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 2,100 | 1,100 | |
| 0220 | 41.4 | 65° | 70° | 100% | 48 ppm | 20 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 4,600 | 4,500 | |
| 0220 | 41.9 | 65° | 75° | 100% | 50 ppm | 20 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 3,400 | 3,100 | |
| 0220 | 42.4 | 65° | 72° | 100% | 50 ppm | 21 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 2,400 | 2,100 | |
| 0220 | 42.6 | 65° | 65° | 100% | 50 ppm | 19 ppm | 1.5 CC | 24.45 | 85 | +5V | 800 | 2,000 | 100 | |
| 0220 | 43.3 | 65° | 65° | 95% | 50 ppm | 16 ppm | 1.5 CC | 24.45 | 85 | +5V | 800 | 3,300 | 3,200 | |
| 0220 | 43.7 | 65° | 65° | 95% | 50 ppm | 17 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 5,000 | 4,700 | |
| 0220 | 44.2 | 65° | 70° | 95% | 48 ppm | 18 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 2,600 | 2,300 | |
| 0230 | 44.7 | 72° | 77° | 95% | 48 ppm | 19 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 2,300 | 1,800 | |
| 0230 | 45.2 | 71° | 82° | 71% | 45 ppm | 18 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 3,100 | 4,800 | |
| 0230 | 45.7 | 71° | 75° | 65% | 65% | 45 ppm | 17 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 2,000 | 200 |
| 1000 | 46.2 | 70° | 75° | 65% | 45 ppm | 19 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 2,000 | 1,100 | |
| 1000 | 46.7 | 70° | 84° | 65% | 46 ppm | 17 ppm | 1.5 CC | 24.45 | 85 | +5V | 700 | 3,500 | 3,200 | |

APPENDIX B - Test log

BAUER H.P. COMPRESSOR (B)

DATE 27 OCTOBER 1993

| REAL TIME | METER HOURS | TEST #P | | CO/P CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | | CHARGED CYLINDER SIZE | | CYLINDER CHARGING INFORMATION | | CYL. FILL TIME MIN. | | | | | | |
|--------------|----------------|----------------|----------------|-----------------------|---------------|-------------------------------------|----------|-----------------------------|---------------------|----------------------------------|----------------------|------------------------------|---------------------------------|---------------|--------------|---------------|-------------|------------|
| | | AMBI TEMP°P | CMP DIA&C/P | % REFRIG FILTER | % FILTER | FLOW RATE | GAS % | END PRESS | CYL HEAD TEMP | AMP METER VOLTS | COMP OIL PRESS | FINAL LINE PSI | SERVICE LINE DISCH PSI | RATED CUTT | RATED PSI | START TIME | END TIME | END PSI |
| 1100 | 47.2 | 86° | 87° | 67% | 48% FILTER | 15 PPM | 1.0 CC | 24.45 | 65 | +5V | 70 | 2,200 | 1,400 | - | - | - | - | - |
| 1130 | 47.3 | 87° | 92° | 65% | 47% FILTER | 10 PPM | 1.0 CC | 24.45 | 80 | +5V | 70 | 2,100 | 1,200 | - | - | - | - | - |
| 1200 | 48.0 | 87° | 100° | 55% | 46% FILTER | 9 PPM | 1.0 CC | 24.45 | 80 | +5V | 70 | 4,000 | 4,100 | - | - | - | - | - |
| 1230 | 48.5 | 83° | 99° | 60% | 47% FILTER | 8 PPM | 1.0 CC | 24.45 | 80 | +5V | 70 | 4,300 | 4,000 | - | - | - | - | - |
| 1300 | 49.0 | 83° | 86° | 65% | 49% FILTER | 8 PPM | 1.0 CC | 24.45 | 80 | +5V | 70 | 2,100 | 1,300 | - | - | - | - | - |
| 1330 | 49.5 | 84° | 97° | 65% | 49% FILTER | 7 PPM | 1.0 CC | 24.45 | 80 | +5V | 70 | 4,300 | 4,600 | - | - | - | - | - |
| 1400 | 50.0 | 85° | 98° | 65% | 49% FILTER | 8 PPM | 1.0 CC | 24.45 | 80 | +5V | 70 | 4,000 | 4,500 | - | - | - | - | - |
| 1430 | 50.5 | 85° | 87° | 65% | 49% FILTER | 7 PPM | 1.0 CC | 24.45 | 80 | +5V | 70 | 2,200 | 1,500 | - | - | - | - | - |

REMARKS:

26 OCTOBER
0700 STARTED ENGINE & COMPRESSOR OIL (ADDED 2 1/2 QUARTS 920 TO ENGINES AND 1 PINT 2190TP TO COMPRESSOR

0720 ADDED 12 GALLON DIESEL FUEL.

0740 STARTED ENGINE AND COMPRESSOR

1100 ADJUSTED "Y" DRIVE BELTS AND CHECKED ENGINE & COMPRESSOR OIL

1400 GREASED CLUTCH BEARING

2200 ADDED 10 GALLON DIESEL FUEL.

27 OCTOBER
0700 ADDED 10 GALLON DIESEL FUEL

1230 GREASED CLUTCH BEARING

1400 ADJUSTED COMPRESSOR OIL REGULATOR

1400 GREASED CLUTCH BEARING, CHECKED ENGINE & COMPRESSOR OIL

1430 SECURED TESTING

APPENDIX B - Test log

BAUER H.P. COMPRESSOR (B)

DATE 28 OCTOBER 1993

| REAL TIME | MOTOR HOURS | TEMP °F | | AMBI HUMID | CO2 CONCENTRATION | | CO INJECTED INTO COMP INTAKE | | END PRESS | CTL HEAD TEMP | AMP METER VOLTS | COMP OIL PRESS | CYLINDER CHARGING INFORMATION | | CTL FILL TIME MIN. | |
|--------------|----------------|----------------|-----------------|---------------|----------------------|-----------------|------------------------------------|----------|--------------|---------------------|-----------------------|----------------------|----------------------------------|-------------|-----------------------------|-------------|
| | | AMBI TEMP°F | COMP DISCH°F | | BEFORE FILTER | AFTER FILTER | FLOW RATE | GAL S | | | | | RATED CUFF | ENDED PW | START TIME | END TIME |
| 0629 | 0629 | STATION ENGINE | | | | | | | 93 | | +5V | | | | | |
| 0700 | 36.4 | 59° | 82.5 | 50°FHM | 12°FHM | 1.1 CC | 24.45 | .93 | | +5V | 860 | 2,160 | .900 | | | |
| 0720 | 36.9 | 60° | 82.5 | 50°FHM | 13°FHM | 1.1 CC | 24.45 | .90 | | +5V | 860 | 2,600 | 2,900 | 3.4 | 5,000 | 1011 |
| 0800 | 51.4 | 61° | 79° | 50°FHM | 12°FHM | 1.1 CC | 24.45 | .85 | | +5V | 860 | 1,000 | 0 | | | 1011 |
| 0820 | 51.9 | 65° | 71° | 74° | 49°FHM | 13°FHM | 1.1 CC | 24.45 | .85 | +5V | 860 | 3,400 | 3,100 | | | |
| 0840 | 52.4 | 66° | 72° | 76° | 49°FHM | 14°FHM | 1.1 CC | 24.45 | .85 | +5V | 860 | 2,900 | 2,600 | | | |
| 0900 | 52.9 | 70° | 75° | 63° | 49°FHM | 15°FHM | 1.1 CC | 24.45 | .85 | +5V | 860 | 3,000 | 2,700 | | | |
| 1000 | 53.4 | 72° | 75° | 64° | 50°FHM | 16°FHM | 1.1 CC | 24.45 | .85 | +5V | 860 | 3,100 | 2,600 | | | |
| 1020 | 53.9 | 69° | 66° | 56° | 50°FHM | 15°FHM | 1.1 CC | 24.45 | .85 | +5V | 860 | 2,000 | 0 | 3.4 | 5,000 | 1032 |
| 1100 | 54.4 | 68° | 77° | 52° | 50°FHM | 17°FHM | 1.1 CC | 24.45 | .85 | +5V | 860 | 5,700 | 3,400 | | | |
| 1120 | 54.9 | 68° | 74° | 64° | 50°FHM | 19°FHM | 1.1 CC | 24.45 | .85 | +5V | 860 | 2,500 | 1,900 | | | |
| 1200 | 55.4 | 69° | 78° | 64° | 50°FHM | 18°FHM | 1.1 CC | 24.45 | .80 | +5V | 860 | 3,600 | 3,500 | | | |
| 1220 | 55.9 | 69° | 74° | 64° | 50°FHM | 15°FHM | 1.1 CC | 24.45 | .80 | +5V | 860 | 2,100 | 1,600 | | | |
| 1300 | 56.4 | 70° | 83° | 63° | 50°FHM | 14°FHM | 1.1 CC | 24.45 | .80 | +5V | 860 | 5,300 | 5,000 | | | |
| 1320 | 56.9 | 75° | 82° | 62° | 50°FHM | 8°FHM | 1.1 CC | 24.45 | .80 | +5V | 860 | 2,500 | 1,900 | | | |
| 1400 | 57.4 | 79° | 81° | 60° | 50°FHM | 10°FHM | 1.1 CC | 24.45 | .80 | +5V | 860 | 2,000 | 0 | | | |

REMARKS:

060 ADDED 7 GALLON DIESEL FUEL.

060 CHECKED ENGINES & COMPRESSOR OIL.

060 GREASED CLUTCH BEARING

070 SECURED ENGINES FOR OIL CHANGE (COULD NOT REMOVE OIL DRAIN PLUG USING 5' CHEATER BAR)

071 SECURED ENGINES

1001 SECURED TESTING

APPENDIX B - Test log

BAUER H.P. COMPRESSOR (B)

DATE 1 NOVEMBER 1993

| REAL TIME | MOTOR HOURS | TEMP. °F | AMBIENT TEMP. °F | COFFM CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | ENR. OIL PRESS. | CYL HEAD TEMP. | AMP METER VOLTS | COMP. OIL PRESS. | FINAL LINE PRESS. | SERVICE LINE DISCH. PS | CHARGED CYLINDER SECS | | CYLINDER CHARGING INFORMATION | | CYL. FULL TIME MIN. |
|----------------------------|------------------------|----------|------------------|---------------------|----------------|-------------------------------|-----------------|----------------|-----------------|------------------|-------------------|------------------------|-----------------------|------------|-------------------------------|---|---------------------|
| | | | | INDOOR FILTER | OUTDOOR FILTER | | | | | | | | RATED CAPT. PM | START TIME | END TIME | | |
| 0704 STARTED ENGINE | | | | | | | | | | | | | | | | | |
| 0800 | 30.1 | 45° | 70° | 30 PPM | 8 PPM | 1.0 CC | 24.45 | 95 | +5V | 850 | 2,300 | 1,000 | - | - | - | - | - |
| 0806 | 30.6 | 45° | 52° | 30 PPM | 7 PPM | 1.0 CC | 24.45 | 90 | +5V | 850 | 3,300 | 5,000 | - | - | - | - | - |
| 0812 | 30.1 | 47° | 56° | 30 PPM | 10 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 4,900 | 4,800 | - | - | - | - | - |
| 0818 | 30.6 | 45° | 54° | 65% | 30 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 5,000 | 2,700 | - | - | - | - | - |
| 1000 | 40.1 | 45° | 62° | 30 PPM | 10 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 2,000 | 700 | - | - | - | - | - |
| 1006 | 40.6 | 39° | 59° | 65% | 30 PPM | 15 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 4,600 | 4,300 | - | - | - | - |
| 1100 | 61.1 | 50° | 59° | 65% | 30 PPM | 20 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 3,700 | 3,400 | - | - | - | - |
| 1130 | 61.6 | 50° | 56° | 65% | 30 PPM | 18 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 2,000 | 100 | - | - | - | - |
| 1200 | 62.1 | 51° | 61° | 62% | 30 PPM | 18 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 3,900 | 3,600 | - | - | - | - |
| 1230 | 62.6 | 54° | 63° | 61% | 30 PPM | 19 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 4,500 | 4,200 | - | - | - | - |
| 1300 | 63.1 | 55° | 59° | 60% | 30 PPM | 19 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 2,000 | 1,000 | - | - | - | - |
| 1330 | 63.6 | 54° | 56° | 60% | 30 PPM | 19 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 1,800 | 1,500 | - | - | - | - |
| 1400 | 64.1 | 55° | 65° | 59% | 30 PPM | 19 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 5,000 | 4,700 | - | - | - | - |
| 1430 | 64.6 | 55° | 60° | 59% | 30 PPM | 19 PPM | 1.0 CC | 24.45 | 85 | +5V | 850 | 2,300 | 1,900 | - | - | - | - |
| 1451 | SECURED TESTING | | | | | | | | | | | | | | | | |

REMARKS

0700 ADDED 10 GALLON DIESEL FUEL

0715 CHECKED ENGINE & COMPRESSOR OIL

0725 GREASED CLUTCH BEARING

1451 SECURED TESTING

APPENDIX B - Test log

DATE 2 NOVEMBER 1993

BAUER H.P. COMPRESSOR (B)

| REAL TIME | METER HOURS | TEMP °F | | AMBI HUMID % | CO/PPM CONCENTRATION | | CO INJECTED INTO COMP. INTAKE | ENG OIL PRESS | CYL HEAD TEMP | AMP METER VOLTS | COMP OIL PRESS | FINAL LINE PSI | SERVICE LINE DISCH PSI | CHARGED CYLINDER SIZE | | CYL FILL TIME MIN | |
|-----------|----------------|-----------------|--------------|--------------|----------------------|--------------|-------------------------------|---------------|---------------|-----------------|----------------|----------------|------------------------|-----------------------|-----------|-------------------|----------|
| | | AMBI TEMP°F | CMP DISCHG°F | | BEFORE FILTER | AFTER FILTER | | | | | | | | RATED CUFT | RATED PSI | START TIME | END TIME |
| 0635 | STARTED ENGINE | - | - | - | - | - | - | 95 | - | +3V | - | - | - | - | - | - | - |
| 0700 | 64.7 | 50° | 54° | 67% | 50 PPM | 18 PPM | 1.1 CC | 24.4% | 95 | - | +3V | 890 | 2,200 | 0 | - | - | - |
| 0730 | 65.2 | 50° | 56° | 67% | 50 PPM | 19 PPM | 1.1 CC | 24.4% | 90 | - | +3V | 880 | 2,300 | 1,900 | - | - | - |
| 0800 | 65.7 | 56° | 62° | 66% | 50 PPM | 20 PPM | 1.1 CC | 24.4% | 85 | - | +3V | 880 | 4,200 | 3,900 | - | - | - |
| 0830 | 66.2 | 60° | 65° | 64% | 46 PPM | 27 PPM | 1.1 CC | 24.4% | 85 | - | +3V | 860 | 2,700 | 2,400 | - | - | - |
| 0900 | 66.7 | 62° | 65° | 63% | 48 PPM | 24 PPM | 1.1 CC | 24.4% | 85 | - | +3V | 860 | 4,000 | 3,700 | - | - | - |
| 0930 | 67.2 | 56° | 55° | 62% | 49 PPM | 26 PPM | 1.1 CC | 24.4% | 85 | - | +3V | 840 | 1,900 | 1,000 | - | - | - |
| 1000 | 67.7 | 57° | 65° | 60% | 50 PPM | 27 PPM | 1.1 CC | 24.4% | 85 | - | +3V | 840 | 2,900 | 2,600 | - | - | - |
| 1030 | 68.2 | 58° | 68° | 61% | 50 PPM | 27 PPM | 1.1 CC | 24.4% | 85 | - | +3V | 840 | 5,100 | 4,800 | - | - | - |
| 1100 | 68.7 | 59° | 57° | 61% | 50 PPM | 28 PPM | 1.1 CC | 24.4% | 85 | - | +3V | 840 | 2,000 | 1,000 | - | - | - |
| 1130 | 69.2 | 59° | 78° | 60% | - | - | - | - | 85 | - | +3V | 840 | 1,800 | 1,000 | - | - | - |
| 1200 | 69.7 | 60° | 69° | 59% | - | - | - | - | 85 | - | +3V | 840 | 3,900 | 3,500 | - | - | - |
| 1230 | 70.2 | 60° | 70° | 59% | - | - | - | - | 85 | - | +3V | 840 | 2,000 | 1,700 | - | - | - |
| 1300 | 70.7 | 60° | 71° | 58% | - | - | - | - | 85 | - | +3V | 840 | 3,500 | 3,200 | - | - | - |
| 1330 | 71.2 | SECURED TESTING | - | - | - | - | - | - | 85 | - | +3V | 840 | 5,300 | 5,000 | - | - | - |

REMARKS:
0630 CHECKED ENGINE & COMPRESSOR OIL (ADDED 1 PINT COMPRESSOR OIL)

0635 GREASED CLUTCH BEARING
0640 ADDED 10 GAL DIESEL FUEL
0655 STARTED ENGINE

0830 AIR SAMPLE TAKEN

1200 SECURED CO INJECTION

1330 SECURED TESTING, 50 HR.

The mean time for pressurizing an 87.7 liter (3.1 cuft) flask from 0 to 345 bars (0 to 5000 psi, 34.14 ATA) is: $40 + 40 = 40$ minutes; therefore, the charging rate is: $87.7 \times 341.14 = 747.95 \text{ SLPM}$ or 26.41 CFM

3

MEMORANDUM

14 October 1993

From: G. Deason, Code 2530
To: Dave Sullivan, NEDU

Subj: Analysis of air sample from Bauer K-20 compressor (1 hour evaluations).

1. In accordance with your request, the air sample received at the gas analysis lab was analyzed and found to contain:

Standard Components

| Components | Level | Limit |
|------------------------|----------|-------------|
| Oxygen | 21.0% | 20-22%*** |
| Nitrogen | 78.1% | NONE*** |
| Argon | 0.9% | NONE*** |
| Carbon Dioxide | 63.0 PPM | 1000 PPM*** |
| Total Hydrocarbons* | 1.8 PPM | 25 PPM** |
| Carbon Monoxide | <0.5 PPM | 20 PPM** |
| Methane | 1.8 PPM | 1000 PPM** |
| Acetone | <0.1 PPM | 200 PPM*** |
| Benzene | <0.1 PPM | 1 PPM*** |
| Chloroform | <0.1 PPM | 1 PPM*** |
| Ethanol | <0.1 PPM | 100 PPM*** |
| Freon 113 | <0.1 PPM | 10 PPM*** |
| Freon 11 | <0.1 PPM | 100 PPM*** |
| Freon 12 | <0.1 PPM | 100 PPM*** |
| Freon 114 | <0.1 PPM | 100 PPM*** |
| Isopropyl Alcohol | <0.1 PPM | 1 PPM*** |
| Methanol | <0.1 PPM | 10 PPM*** |
| Methyl Chloroform | <0.1 PPM | 30 PPM*** |
| Methyl Ethyl Ketone | <0.1 PPM | 20 PPM*** |
| Methyl Isobutyl Ketone | <0.1 PPM | 20 PPM*** |
| Methyl Chloride | <0.1 PPM | 25 PPM*** |
| Toluene | <0.1 PPM | 20 PPM*** |
| Trimethyl Benzenes | <0.1 PPM | 3 PPM*** |
| Xylenes | <0.1 PPM | 50 PPM*** |

Other Components

| Component C4+ PPM | Level <0.1 PPM | Limit <0.1 |
|-------------------------|-------------------|---------------|
|-------------------------|-------------------|---------------|

*Expressed as methane equivalents.

**Limits from process instruction #0558-839.

***Limits from Navy Dive Manual; Vol 2, Rev 3.

****OSHA Final Rule limits published as of July 1992 (not specified in Navy Dive Manual.)

2. The sample showed no appreciable contamination. All components were within the acceptable range.


Glen Deason
Chemist

Memorandum

27 October 1993

To: Dave Sullivan, NEDU
From: Glen Deason, Code 2530
Subject: Analysis of air sample from the Bauer K-20 #B
compressor evaluation test, 25 hour sample.

1. In accordance with your request, the air sample delivered to the gas analysis lab was analyzed and found to contain:

Standard Components

| Component | Level | Limit |
|------------------------|----------|-------------|
| Oxygen | 21% | 20-22%*** |
| Nitrogen | 78.1% | NONE*** |
| Argon | 0.9% | NONE*** |
| Carbon Dioxide | 505 PPM | 1000 PPM*** |
| Total Hydrocarbons* | 1.9 PPM | 25 PPM** |
| Carbon Monoxide | 21.6 PPM | 20 PPM** |
| Methane | 1.9 PPM | 1000 PPM** |
| Acetone | <0.1 PPM | 200 PPM*** |
| Benzene | <0.1 PPM | 1 PPM*** |
| Chloroform | <0.1 PPM | 1 PPM*** |
| Ethanol | <0.1 PPM | 100 PPM*** |
| Freon 113 | <0.1 PPM | 100 PPM*** |
| Freon 11 | <0.1 PPM | 100 PPM*** |
| Freon 12 | <0.1 PPM | 100 PPM*** |
| Freon 114 | <0.1 PPM | 100 PPM*** |
| Isopropyl Alcohol | <0.1 PPM | 1 PPM*** |
| Methanol | <0.1 PPM | 10 PPM*** |
| Methyl Chloroform | <0.1 PPM | 30 PPM*** |
| Methyl Ethyl Ketone | <0.1 PPM | 20 PPM*** |
| Methyl Isobutyl Ketone | <0.1 PPM | 20 PPM*** |
| Methylene Chloride | <0.1 PPM | 25 PPM*** |
| Toluene | <0.1 PPM | 20 PPM*** |
| Trimethyl Benzenes | <0.1 PPM | 3 PPM*** |
| Xylenes | <0.1 PPM | 50 PPM*** |

Other Components

| Component | Level | Limit |
|-----------|----------|-------|
| NONE | | |
| C4+ | <0.1 PPM | NONE |

*Expressed as methane equivalents.
**Limits taken from process instruction #0558-839.
***Limits taken from Navy Dive Manual; Vol. 2, Rev. 3.
**** OSHA Final Rule limits published as of July 1992 (not specified in Navy Dive Manual).

2. The above sample showed appreciable contamination; all components were not within the acceptable range.


Glen Deason
Chemist